

Application Serial Number 10/765,647  
Response to Office Action  
Dated December 13, 2007

Reply under 37 CFR 1.116 – Expedited Procedure – TC 1700

### REMARKS / DISCUSSION OF ISSUES

Claims 1-20 are pending in the application. Claims 1 and 12 are the independent claims. As no amendment is made to the claims, a listing is not required under Rule 121, and is not provided.

#### **Rejections under 35 U.S.C. § 103**

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fathimulla, et al.* (U.S. Patent 5,338,394) in view of *Pearlton, et al.* (Applied Physics Letters 60(7) (1992)). For at least the reasons set forth below, Applicants respectfully submit that a *prima facie* case of obviousness has not been established as to the rejected claims.

Because the rejection of the present Office Action is essentially identical to that traversed previously, Applicants maintain for the record, to the extent applicable and proper, their position set forth in the Response accompanying the RCE filed on October 31, 2008. The present Reply augments this position and addresses the Response to Arguments proffered by the Examiner in the Final Office Action.

##### i. Relevant Law:

As stated in MPEP § 2143, in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Applicants rely at least on the following standard of law as it relates to obviousness. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or

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nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. While the sequence of these questions might be reordered in any particular case, the factors continue to define the inquiry that controls. If a court, or patent examiner, conducts this analysis and concludes the claimed subject matter was obvious, the claim is invalid or unpatentable under § 103. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727; 82 U.S.P.Q.2D 1385 (2007), citing, in part *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

However, the Court in *KSR* continued: "A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U.S., at 36, 86 S. Ct. 684, 15 L. Ed. 2d 545 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "'guard against slipping into the use of hindsight'" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (CA6 1964)))." Moreover, if there is no suggestion to combine the teachings of the applied art, other than the use of Applicants' invention as a template for its own reconstruction, a rejection for obviousness is improper. *Ex parte Crawford, et al.* Appeal 20062429, May 30, 2007.

The Court in *KSR* further explained that when the prior art teaches away from a combination, that combination is more likely to be nonobvious. Notably, the CAFC stated in *In re Gurley*, which the Court relied upon in *KSR*:

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, *would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant . . . [or] if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant.*" *In re Gurley* 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994).

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ii. Claims 1 and 12

Claim 1 is drawn to a method for etching III-V semiconductor material and features:

*“...introducing a first gas chosen from HBr, HI and IBr into said reactive ion etching reactor; introducing a second gas of CH<sub>4</sub> into said reactive ion etching reactor; introducing a third gas of H<sub>2</sub>; and exposing a portion of said III-V semiconductor material to be etched to a mixture comprising said first, said second and said third gas.”*

As such, among other aspects, the method of claim 1 includes: introducing a first gas into an RIE reactor, and introducing methane (CH<sub>4</sub>) into the reactor and introducing H<sub>2</sub>. Claim 12 is drawn to a method for etching a III-V semiconductor substrate and includes the noted features. Thus, claims 1 and 12 teach the use of introducing **HBr and CH<sub>4</sub> and H<sub>2</sub>**.

a. References Teach Away

A review of portions of *Fathimulla, et al.* relied upon in the rejection does reveal the use of HBr as an alternative to SiCl<sub>4</sub> in a mixture of CH<sub>4</sub>; or the use of HBr as an alternative to SiCl<sub>4</sub> in a mixture of H<sub>2</sub>. As such, the reference discloses the use **HBr and CH<sub>4</sub>; or HBr and H<sub>2</sub>**. Respectfully, with all three compounds at their disposal, *Fathimulla, et al.* do not direct one skilled in the art to combine all three, but rather direct one skilled in the art to limit the mixture to **HBr and one or the other of CH<sub>4</sub> or H<sub>2</sub>**. As such, Applicants respectfully submit that one skilled would be led in a direction divergent from the path that was taken by the applicant. Thus, Applicants respectfully submit that the reference to *Fathimulla, et al.* teaches away from the use of all three compounds, **HBr and CH<sub>4</sub> and H<sub>2</sub>**.

Conceding the lack of disclosure in *Fathimulla, et al.* of introducing HBr and CH<sub>4</sub> and H<sub>2</sub>, the Examiner attempts to cobble a rejection by selecting the combination of gases HBr and CH<sub>4</sub> from *Fathimulla, et al.* and combining these with the disclosure of *Pearton, et al.* of the use of H<sub>2</sub>. However, one of ordinary skill in the art would not have been

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encouraged by *Pearton, et al.* to combine these gases, but rather would have been discouraged to combine **CH<sub>4</sub> and H<sub>2</sub>**. Notably, the reference states:

“The major limitation with the use of CH<sub>4</sub>/H<sub>2</sub> discharges is the slow etch rates... [and] Several attempts to enhance the CH<sub>4</sub>/H<sub>2</sub> etch rates by addition of Cl<sub>2</sub> (Ref. 9) and PCl<sub>3</sub> (Ref. 10) have been reported, but relatively high self-biases were needed to achieve practical etch rates and careful seasoning of the reactor necessary for reproducible results.” (See page 838, left column.)

Furthermore, at page 839, right column, *Pearton, et al.* states:

“With CH<sub>4</sub>/H<sub>2</sub> mixtures at high microwave powers, the InP surface becomes rapidly deficient in phosphorous, and the morphology for even small (< 2000 Å) etch depths is unacceptable.”

So, if one were looking to supplement the two-gas mixture of HBr and CH<sub>4</sub> disclosed in *Fathimulla, et al.*, a review of *Pearton, et al.* would clearly discourage one from combining CH<sub>4</sub> and H<sub>2</sub>. Therefore, one skilled in the art would be discouraged from introducing the compounds **HBr and CH<sub>4</sub> and H<sub>2</sub>** as claimed.

Applicants respectfully submit that for at least the reasons set forth above, one skilled in the art **would be led by *Pearton, et al.* in a direction divergent from the path that was taken by Applicants**, i.e., namely to introduce **HBr and CH<sub>4</sub> and H<sub>2</sub>** as set forth in claims 1 and 12. Thus, the reference to *Pearton, et al.* teaches away from that which is claimed. In keeping with the holding in *KSR*, because the prior art teaches away from a combination, that combination is more likely to be nonobvious.

#### b. Combination Relies on Impermissible Hindsight

As noted, if there is no suggestion to combine the teachings of the applied art, other than the use of Applicants' invention as a template for its own reconstruction, a rejection for obviousness is improper. In the present rejection, for at least the reasons set forth above, the combination not only does not suggest the introducing of **HBr and CH<sub>4</sub> and H<sub>2</sub>**, but also the combination discourages it. Therefore, but for the use of Applicants' claims as a template for their reconstruction, the proffered combination of

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references could not be made. As such, the rejection relies on impermissible hindsight and is wholly improper.

c. Response to Arguments

In response to Applicants' earlier Arguments, the Examiner directs Applicants to page 839, column 1, second paragraph and asserts that the use of CH<sub>4</sub> and H<sub>2</sub> is beneficial to obtain smoother surfaces. Notably, this portion of the reference does not even mention the use of methane, but rather HI/H<sub>2</sub>/Ar. The only mention of methane in column 1 of page 839 is in discussion of its use with HI and Ar. Accordingly, Applicants respectfully demur the position proffered by the Examiner.

d. Rejections are improper

Applicants respectfully submit that for at least the reasons set forth above, the rejection of claims 1 and 12 are improper. Accordingly, claims 1 and 12 are patentable over the applied art. Furthermore, claims 2-11 and 13-20, which depend from claims 1 and 12, respectively, are patentable for the same reasons and in view of their additionally recited subject matter.

Conclusion

In view of the foregoing, applicant(s) respectfully request(s) that the Examiner withdraw the objection(s) and/or rejection(s) of record, allow all the pending claims, and find the application in condition for allowance.

If any points remain in issue that may best be resolved through a personal or telephonic interview, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

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